

**Page Denied**

50X1-HUM

# NEW DEVELOPMENTS IN MICROSCOPES CONSTRUCTION AT ZEISS JENA.

Two things are realized at Jena. First, that the electron microscope is at a disadvantage when compared with the light microscope for modern biological research. This is largely because the object of an electron-optical investigation must be prepared in a certain way often requiring heat, high-vacuum, and the separation of the object into thin layers, and this preparation can largely destroy the object. A few of objects such as bacteria are ~~are~~ too thick for an exhaustive investigation. It is also fundamental that using, perhaps, mushroom spores as the most convenient objects, an already high destruction rate makes continued cultivation impossible after the investigation. It would, then, for this reason be desirable to raise the resolving power of the (light) microscope. This desire stood until now beside real difficulties which were held by the co-workers to be naturally unattainable, accepted theory to the contrary (Diesem Wunsch stand bisher neben echten Schwierigkeiten, die Abbesche Theorie der mikroskopischen Abbildung entgegen, die in Jena naturgemäss von dem Mitarbeitern als unantastbar gehalten wird). A few signs, especially American work, have indicated that it ~~is~~ (the problem) is dilatable, at least at many points, and that resolution can be improved.

The very distinguished mathematician in the field of microscopic optics, Boegehold (Planapochromatics, etc.) is at present working on the problem in conjunction with Dr. Gause. Gause is the distinguished researcher who was fundamentally responsible for calculations that, on the whole, increased performance about ten-power. The resolving power of the microscope should, in consequence, be improved once the mechanical performance with regard to focussing is improved. As it appears, dry systems of lenses will be constructed at first, so, proceeding from the resolving power, the aperture should ~~high~~ lie in the region 1.6 - 1.8 A.

It is not entirely clear whether we are concerned with a pure reflecting microscope or with a mirror-lens combination. It appears from the expressions of Gause that if a mirror-lens combination is installed that although the color defect (Farb-fehler) causes picture deterioration, one can better compensate the defective zones. The systems are being thought of for real images.

In addition to this system one can, following Casperson, further improve micro-spectroanalysis in all frequency ranges - especially the ultra-violet. One is convinced thereby, that for smallest image points it is possible to construct spectrum curves from very small particle differentiations (Partikeldifferenzierungen).

~~Summary:~~

Contrary to the tendencies of Harting and Trapp, Gause will install the reflecting microscope, and he shows the worth of the reflecting systems in this possible application. Also, on this basis, he refuses to endorse reflecting systems as substitutes for apochromatics, as were constructed by Trapp and Harting. This especially is not entirely fortunate because the image in the reflecting system does not exhibit the brilliance which is characteristic of a lens system.

The combinations of lenses and mirrors devised in the U. S. by Land are not very satisfactory for the new tasks because they do not have the extremely good achromatic qualities which are necessary for spectroanalysis.

The spectroscope should be fitted with a monochromator, for all work is conducted with transmitted light. In addition the light source should be of a type such as the Xenon filled Ultra-violet ray lamp. If at all possible, the spark generator of the carbon-burning apparatus should be done away with. Also, the long-wave X-ray region should be included in the region to be investigated. For this an X-ray optical system would be built since one time the mirror will be covered with simple crystals (Einkristallen) and at others refracted crystals (gebogene Kristalle) are applied. Here ~~personal difficulties enter~~ (persönliche Schwierigkeiten) difficulties enter.

The monochromators are necessary to press in still a further direction of work, preliminary research having shown that much can be attained with the phase contrast principal in the infra-red.

The old idea of building condensers would permit the illumination of the preparations and at the same time simplify the extreme covering (Ultrabeschallung) of the objects. Special forms of the dark field condensers would most nearly come in question for this, as far as a phase condenser is considered, but their development has by no means yet been observed.

Gensee's primary interest is mineralogy and the testing of microscopic industrial materials. For this he is preparing vacuum heating stages (Vakuumheiztische) which are nearly ready. X-ray apparatus would also play a role here. The spectrum apparatus, built by this new method, would appear to have a most important place in the Havemann hardness-test. For this purpose an electrode is introduced into an existing aperture in the microscope objective until it is immersed. It would thus be possible to generate sparks aimed down to .001 mm. by enclosures which would lead from the same objective to the spectrum apparatus. The arrangement would supplement Linnik's new interferometer arrangement. It is not altered from the known apparatus in principle arrangements

50X1-HUM

[redacted] an intense inquiry was made from the east - not only Russia, but Rumania also- concerning polarising microscopes (Polarisationsmikroskopen - sic) For this purpose instruments were desired which exceeded those which had thus far been constructed. Russia wants to have apparatus which permits all conceivable investigations with respect to ore-assaying including spectrum examinations.

The new investigations which have been accomplished with apochromatics are very interesting. It compares in this manner with the best parts of a great series. If, now, a material, such as a crystal, is immersed in a medium of equal refractive index, the refraction ceases so that the crystal is invisible. With appropriate lighting, color stains are placed at the position of the object. These stains are separated into equal series by a simple system (from red, through green, to light blue) Here it is shown that the dispersion of the material is different from that of the of the surrounding medium. The effect can be strengthened with proper illumination. A new method is being developed for the testing of Aluminum Hydroxide which is able to detect impurities very easily. [redacted] materials in amounts too small to be detected chemically can easily be resolved optically.

50X1-HUM

The phase light-contrast process (Phasenauflichtverfahren) works just as well in the case of variable phase shift.

As quartz is largely absent in Jena, it has been said that quartz crystals are being grown. The results are not yet very good, but they show much promise.

Sapphire is also being experimented with, but "as yet it is not right."

**Page Denied**

Next 17 Page(s) In Document Denied